REMARKS

Claims 1 and 7 are amended. Claims 1-35 are pending in the application.

Claims 1, 4, 7 and 9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Harada et al., U.S. Patent No. 5,631,868. Anticipation of a claim requires that each and every element of the claim be disclosed in a single prior art reference (MPEP § 2131). Claims 1, 4, 7 and 9 are allowable over Harada for at least the reason that Harada fails to disclose each and every element in any of those claims.

As amended, independent claim 1 recites feeding a single feed gas comprising at least 99.999% O_2 (by volume) through an ozone generator, and contacting the ozone, or a fragment of the ozone, with a material on a semiconductor substrate. The amendment to independent claim 1 is supported by the specification at, for example, page 4, line 14 through page 5, line 10 and page 10, lines 4-12. Harada discloses mixing oxygen gas and at least one of nitrogen, carbon dioxide and carbon monoxide, and using the mixture as a feed gas to supply an ozone generator (col 7, lns 38-46; col 6, lns 33-36; col 6, lns 48-55; col 3, lns 44-48 and col 2, lns 56-60. Harada does not teach the recited feeding a single feed gas comprising 99.999% O_2 through an ozone generator to generate ozone and contacting the ozone or a fragment of the ozone with a material on a semiconductor substrate. Independent claim 1 is therefore not anticipated by Harada and is allowable over this reference.

Dependent claim 4 is allowable over Harada for at least the reason that it depends from allowable base claim 1.

As amended, independent claim 7 recites feeding a single feed gas comprising O_2 and less than or equal to 0.001% N_2 (by volume) through an ozone generator to generate ozone, and contacting the ozone, or a fragment of the ozone, with a material on a semiconductor substrate. Independent claim 7 is allowable over Harada for reasons similar to those discussed above with respect to independent claim 1. Dependent claim 9 is allowable over Harada for at least the reason that it depends from allowable base claim 7.

Claims 2, 3, 5, 6, 8, 10 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Harada in view of one ore more of Ury et al., U.S. Patent No. 4,885,047, De et al. (JP411219926A) and Shirai et al., U.S. Patent No. 5,683,857. As discussed above with respect to independent claims 1 and 7, Harada fails to disclose the recited feeding a single feed gas through an ozone generator where the feed gas comprises at least 99.999% O_2 (recited in claim 1) or comprising O_2 and less than or equal to 0.001% N_2 (recited in claim 7). Furthermore, Harada does not suggest the recited feeding a single feed gas through an ozone generator, the feed gas comprising 99.999% O_2, or comprising O_2 and less than or equal to 0.001% N_2. Not one of Ury, De or Shirai disclose or suggest the recited feeding a single feed gas through an ozone generator, the feed gas comprising 99.999% O_2, or comprising O_2 and less than or equal to 0.001 % N_2. Harada as combined with one or more of Ury, De and Shirai, fails

to disclose or suggest the recited feeding a single feed gas through an ozone generator, the feed gas comprising 99.999% O_2, or comprising O_2 and less than or equal to 0.001% N_2. Independent claims 1 and 7 are therefore allowable over the various cited combinations of Harada, Ury, De and Shirai.

Independent claims 2, 3, 5, 6, 8, 10 and 11 are allowable for at least the reason that they depend from the corresponding allowable base claim 1 or 7.

Claims 12-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Harada in view of Ury and Shirai. The applicant reminds the Examiner, by direction to MPEP § 2143, that a proper obviousness rejection requires 1) a suggestion or motivation within the references or within knowledge generally available to one of ordinary skill in the art, to modify or combine reference teachings, 2) a reasonable expectation of success, and 3) as combined, the references must teach or suggest each and every claim limitation. Claims 12-35 are allowable over the cited combination of references for at least the reason that the references, as combined, fail to teach or suggest each and every limitation in any of those claims.

Independent claims 12 and 25 each recite forming a mixture of ozone and organic solvent vapors in a reaction chamber and contacting at least some of the ozone and solvent vapors with a material on a semiconductor substrate. As noted by the Examiner in the action at page 3, section 6, Harada and Ury fail to disclose the recited mixing ozone with an organic solvent vapor prior to

contacting with a material on a semiconductor substrate. Applicant additionally notes that Harada and Ury each fail to suggest the recited organic solvent vapor.

Shirai distinctly discloses removal of a silanol compound utilizing a solvent vapor, followed by dry developing treatment with an oxygen plasma (see col 7, lns 5-8 and examples 1-4). As noted by the Examiner, Shirai fails to disclose the recited forming a mixture of ozone and organic solvent vapors. Independently or as combined, Harada, Ury and Shirai fail too disclose or suggest the recited forming a mixture of ozone and organic solvent vapors in a reaction chamber and contacting at least some of the ozone and solvent vapors with a material on a semiconductor substrate. The Examiner states, however, that "it would be obvious to one skilled in the art at the time of the invention that using organic solvent vapor with oxidizing agent including oxygen and ozone would be able to remove the resist with an anticipation of expected result". The Examiner further states that "oxidizing agent such as oxygen and ozone would have to be mixed with the organic vapor in the air prior to contacting the substrate". These statements by the Examiner are not supported by or suggested by the cited combination of references. Since the position taken by the Examiner is not supported or suggested by the cited references, it appears that the Examiner has engaged in impermissible hindsight reconstruction based upon the applicant's disclosure. Because Harada, Ury and Shirai, independently or as combined, fail to teach or suggest the recited forming a mixture of ozone and organic solvent vapors in a reaction chamber and contacting at least some of the ozone and

solvent vapors with a material on a semiconductor substrate, independent claims 12 and 25 are allowable over this combination of references.

Dependent claims 13-24 and 26-35 are allowable over the combination of Harada, Ury and Shirai for at least the reason that they depend from the corresponding allowable base claim 12 or 25.

For the reasons discussed above, pending claims 1-35 are allowable. Accordingly, applicant respectfully requests formal allowance of such pending claims in the Examiner's next action.

Respectfully submitted,

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Application Serial No. 09/653,157
Filing Date ..... August 31, 2000
Inventor ..... Torek et al.
Assignee ..... Micron Technology, Inc.
Group Art Unit 1765
Examiner ..... Deo
Attorney's Docket No. MI22-1376
Title: Methods of Removing at Least Some of a Material From a Semiconductor Substrate

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING RESPONSE TO NOVEMBER 28, 2001 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

1. (Amended) A method of removing at least some of a material from a semiconductor substrate, comprising:

feeding a single feed gas through an ozone generator to generate ozone from the feed gas; the feed gas comprising at least 99.999% O_2 (by volume); and

contacting the ozone or a fragment of the ozone with a material on a semiconductor substrate to remove at least some of the material from the semiconductor substrate.

7. (Amended) A method of removing at least some of a material from a semiconductor substrate, comprising:

feeding a single feed gas through an ozone generator to generate ozone from the feed gas; the feed gas comprising O_2 and less than or equal to 0.001% N_2 (by volume); and

contacting the ozone or a fragment of the ozone with a material on a semiconductor substrate to remove at least some of the material from the semiconductor substrate.

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